

Description of an apparatus for injuries & diseases of joints, with observations and cases / by Benjamin Barrow.

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Publication/Creation

Worcester : Deighton, [1847]

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DESCRIPTION

OF AN

*Royal Society of England
from the Author*

APPARATUS

FOR

INJURIES & DISEASES OF JOINTS,

WITH OBSERVATIONS AND CASES.



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ST. BARTHOLOMEW'S HOSPITAL.

From the Provincial Medical and Surgical Journal.

WORCESTER: DEIGHTON AND CO., HIGH-STREET.

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DESCRIPTION

OF AN

APPARATUS FOR INJURIES AND DISEASES OF JOINTS.

By BENJAMIN BARROW, ESQ., CLIFTON, BRISTOL.

THE following observations are submitted to the public in the hope that they contain some novelties, the knowledge of which will be found useful in the management of diseased and injured joints.

An almost constant attendance for ten years at St. Bartholemew's and other large Metropolitan and Continental Hospitals, and some years of private practice, have afforded me in the first place, many opportunities for comparing the various modes employed in the treatment both local and general of injuries and diseases of joints; secondly, the results arising from these various plans; and lastly, how the means and apparatus in general use might be improved and deficiencies supplied. I must premise that it is not my intention to enter more minutely into the history of these cases, either as regards the course they run, or the treatment ordinarily employed, than may be necessary for the clear explanation of the apparatus which I am desirous of introducing to general use, for the valuable treatise upon the subject of the diseases to which joints are liable by Sir Benjamin Brodie, precludes the necessity, I might say the possibility, of any subsequent writer, however great his experience, adding to it any important information.

The prominent position which the joints, especially the elbow and knee, hold in the human frame, augments considerably their liability to receive more frequently than other parts of the body external injuries; no parts are so prone to inflame as the joints; in no part wherein inflammation has once set up, does it increase so rapidly as in the synovial membrane, which renders it so much the more important that all motion in a joint should be immediately restrained and altogether prevented after the first appearance (however slight,) of inflammation, at the same time that all necessary local remedies are efficiently applied. To obtain this end has been my object, as also to explain the requisites for carrying out the above measures, and at the same time to direct more attention than it appears to me has hitherto been done, to the quiet treatment which diseases and injuries of the joints in every stage require.

I believe it will be found that by the aid of the splint,* represented in the cut, *Fig. 1*, the objects just named may be efficiently carried out, as also the views and directions of Sir Benjamin Brodie most fully complied with. These views and directions I cannot do better than give in his own words,—he says, “Not only in cases of inflammation of the synovial membrane, but in all other cases in which actual disease of a joint exists, the disease, whatever it may be, is kept up and aggravated by motion and exercise, and whatever means can be employed so as to keep the joint in a state of complete repose will go far towards the production of a cure. In the early stage of acute inflammation of the synovial membrane, indeed no interference on the part of the surgeon is necessary for this purpose, the pain which the patient experiences, in every attempt made to use the limb being sufficient to prevent him using it. But it is otherwise when the inflammation has in a great degree subsided. At this period the motion of the joint occasions little or no inconvenience at the time, although it invariably tends to aggravate the symptoms afterwards. It is difficult to persuade a patient thus situated to submit to a very rigid system of confinement, and if he should do so, there is always danger in protracted cases that his general health may suffer in consequence. It is important that he should not be altogether deprived of the opportunity of taking air and exercise; yet it is necessary that the affected joint should be kept in a state approaching as near as possible to one of complete repose. This double object may be attained by means of a proper bandage applied so as to restrain the motions of the joint, at the same time that it makes no more than a moderate degree of pressure on it. As to the best mode of carrying this plan into execution, the surgeon must exercise his own judgment in each individual case. If the disease be far advanced, and there is danger of the cartilages

* The Society of Arts of London awarded the silver medal for the year 1841, for this apparatus.

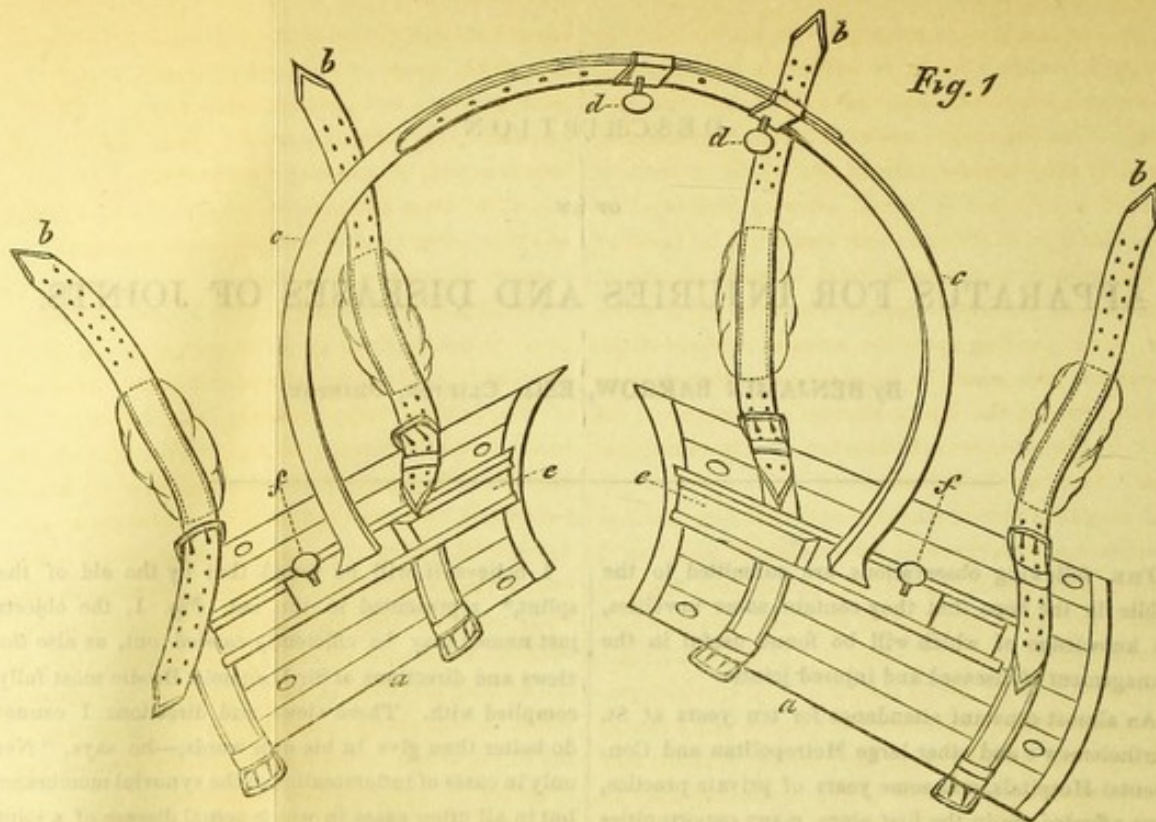


Fig. 1

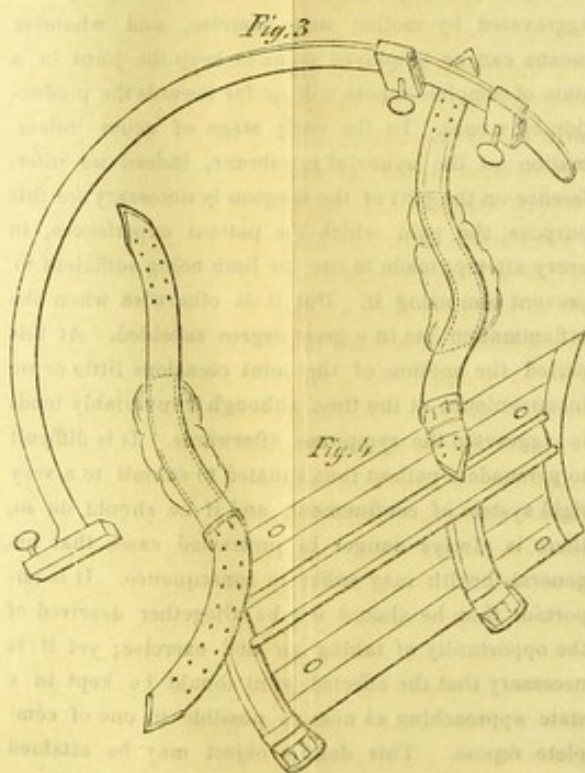


Fig. 3

Fig. 4

being ulcerated, he will find it prudent to restrain the motions of the joint altogether."

Upon these observations I must venture to make one or two comments. The first I would offer is, that there has always appeared to me to exist, even from the commencement of inflammation in the synovial membrane, the *greatest* necessity for keeping the affected joint *perfectly at rest*; for although pain however severe, be present in the first stages of the attack, and to such a degree, as in a great measure to prevent all voluntary motion, still we must all be sufficiently conscious of the many involuntary movements as it were, to which our limbs are subject, whether waking or sleeping, not to trust altogether to this pain as a restriction from motion,—motion which must more or less aggravate and increase the irritation already existing in the joint.

The great difficulty of restraining motion in, and avoiding pressure upon, the joint, at the same time that the full and complete application of all remedies necessary for the prevention of inflammation and alleviation of pain is carried on, has been, I am well aware, most frequently the cause of this part of the treatment being neglected; but I am in hopes that the apparatus represented by *Fig. 1*, will be found calculated to overcome, on future occasions, every similar obstacle.

Description of Figures.

FIG. I.—(a a)—The wooden splints divided. b b b b the straps and buckles.

(c c)—The arc or bow. d d, the screws which bind together the two portions of the arc or bow. e e, the grooves in which the arc or bow moves, allowing the splints to be brought nearer to, or removed farther from, one another. f f, the screws which confine the portions of arc or bow in the grooves e e.

FIG. II.—Represents the screws or stops which allow of the two portions forming the arc or bow to move to a certain extent one upon the other.

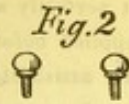
FIG. III.—Represents one portion of the arc or bow removed from its groove.

FIG. IV.—Represents the wooden splint, with its straps and buckles attached.

That air and exercise are highly necessary, especially for those persons who are so frequently the subject of diseased joints, (viz., the scrofulous,) no one will deny. This end can, by means of the splint in question, be most fully attained, during the whole progress of cure of any disease or injury, allowing the requisite remedies to be at the same time continued, no pressure being applied to the joint itself,—a most prejudicial practice, particularly as regards the knee-joint, where the patella pressing upon the articular surfaces of the femur and tibia must, by the consequent friction, very much increase the injury already inflicted upon the joint by the previous inflammation, at the same time that it keeps up the irritation.

I may here remark that the apparatus I am about to describe has been invented some length of time, but I have delayed presenting it to my professional brethren until I had tested its utility in all those cases for which I considered it peculiarly adapted. It will be well also to observe, that the arc or bow, (*c.c.*, *Fig. 1.*) which presents an awkward appearance, but with which I cannot discover the possibility of dispensing without very much impairing the value of the apparatus, may be unsightly, but still not inconvenient nor unnecessary, affording as it does complete protection to the joint, whether the patient be in bed, or up and about. A blow upon it when the splint is applied to the arm conveys no shock to the joint, the whole limb moving together from the shoulder. The same applies to the knee, when the splints are placed, one above, the other below, the joint. It will be observed, that the two splints (*a a*, *Fig. 1.*) are split, to allow of their close adaptation to the limb; they must be padded, and then firmly fixed, by means of the straps and buckles, *b b*, *b b*, (or by what would be much better, a piece of elastic webbing, extending the whole length of either splint, and laced at the side, for the narrow straps are very apt to act as ligatures, and to cause much pain and uneasiness from their unequal pressure,) one to the upper, the other to the forearm; or the one to the thigh, the other to the leg, as the case may be. The two splints are connected by the steel arc or bow *c c*, which is formed of two pieces, sliding one upon the other, in order to allow of the limb being brought to any angle, or placed straight, as occasion may require. This being accomplished, they are fixed by means of the screws, *d d*. Thus the two divisions of the limb are as it were connected, and consequently the joint kept perfectly at rest; at the same time being, as I have before stated, quite free for the application of all necessary remedies. It will be farther noticed that the two steel portions forming the arc or bow move in the brass grooves *e e*, in order to allow of the splints being moved nearer to or farther from the joint, as circumstances may arise; the bow being again firmly fixed in the grooves by the binding screws *f f*. The holes observable on one of the steel portions are to

admit the small screws or stops represented by *Fig. 2*, and which allow of our giving to the joint moderate and gradual motion and extension; the binding screws *d d* being then removed. A strap may be fastened to any of the brass buttons *o o o o o*, fixed to the splints; and this being carried round the neck and shoulders answers the purpose of a sling.



In addition to the cases to which I have alluded as likely to be benefitted by the use of this splint, I may add that it is extremely serviceable in cases of fracture of the patella, fully answering the purpose of all bandages hitherto employed, and which more or less interfere with the application of remedies, and with the joint itself. The two splints *a a* being brought as near as required, one to the upper, the other to the lower, end of the fractured portions, pressure as much as may be necessary to keep them in apposition and close connection can be most effectually accomplished, and kept up as long as there is that disposition to separate, which so frequently takes place as a consequence of the strong action of the muscles attached to, and surrounding the upper portion of the patella.

In like manner may the splint be most advantageously applied in cases of fracture of the olecranon, especially when the triceps muscle is strong, and we find the fractured portion drawn upwards some distance from the ulna. No accident is so likely to produce mischievous consequences to the joint, and interfere with its after utility, as fracture of the ulna, unless properly attended to in the first instance.

Contraction which so often follows inflammation of the joints, may be completely prevented by applying the splint in the early stages of the attack; and even should contraction have taken place, it may be overcome by means of the splint, the angle being changed *gradatim*, the joint being at the same time fomented and rubbed as may be desired. The great difficulty in the first place in preventing these contractions, and in the second, in overcoming them, has hitherto been the want of some apparatus which would leave the joint perfectly free, patients being unable to endure the pain consequent upon constant pressure. I, in common with every one, under whose care even a single case of contraction of the elbow or knee-joint has fallen, have had many occasions of observing, that unless the action be constantly persevered in, the limb, in a very short space of time, regains its previously-contracted position.

The splint will be found a useful adjunct to the means already employed in the treatment of those cases in which the tendons of the hamstring muscles are divided, on account of contraction or partial ankylosis of the knee joint.

I have no doubt but that this apparatus will likewise afford most important aid in those cases in which the extirpation of the articular ends of the bones may be necessary; not only will it be found useful in

maintaining the limb at the required angle, and keeping it perfectly at rest after the operation, but it may be applied before the operation, supplying the place of an assistant, holding the two divisions of the limb much more steadily than can be done by the firmest hand, and not at all interfering with the surgeon's manipulations, the joint being free in its entire circumference.*

By slight modifications in the shape and size of the splints, and length of the straps, any joint in the body may, by means of this apparatus, be kept perfectly at rest, and guarded from external violence.

It is well here to add, that the splints require most careful padding and adjustment, for at some angles it will be found that either the upper one will be raised and the lower one depressed, or *vice versa*. In such cases, unless the padding be good, inconvenience will be experienced by the patient, undue pressure being made on the soft parts.

Thus have I endeavoured to explain an apparatus most simple in its mode of action, easily managed, and made at a very moderate cost.†

I have selected from many others the following cases, in which I have employed my joint apparatus with the greatest advantage, and which I here recite without any comments as to the general and local treatment specifically used, and which were of course regulated in the various cases, according to their requirements:—

CASE I.

A boy, aged ten years and a half, came under my notice, being afflicted with that condition of the right knee-joint, so common in scrofulous children. He had suffered more or less from this affection for several years; abscesses had formed, broken, and healed, from time to time; the leg became bent at right angles to the thigh, and thus the lad was almost incapacitated from moving about, except by hopping upon one leg, with the aid of a crutch. The least pressure upon the patella caused him so much pain, and increased the swelling so considerably, besides inducing inflammation, that any plan for gradually extending the leg, which in any way interfered with the joint itself, was obliged to be abandoned.

I recommended the use of my splint, which was accordingly employed for a lengthened period, at the same time that fomentations and soothing applications were constantly used around the joint. The angle of the splint was changed at first about twice a week, and then every other day, until the position of the limb was so much improved that the boy could walk tolerably well, at the end of three months, without the aid of crutch or stick.

The boy sometimes during the progress of this cure complained of so much pain that it was found necessary to remove the apparatus. In twenty-four hours

* A much larger bow than is necessary in most cases might be attached to the splints during the performance of the operation.

† Mr. Ferguson, surgical instrument maker to St.

the limb would have almost regained its right-angular position. To obviate as much as possible this inconvenience, and consequent retarding of the cure, whenever my splint was removed, I directed the foot to be tied to a foot-board, and a straight splint to be placed against the patient's heel and thigh. This plan had the desired effect of preventing the frequent retraction.

CASE II

Occurred in a boy of about seven years, who was afflicted with a diseased elbow, bearing in every respect a strong resemblance to the knee-joint just described. The left arm was almost disabled; the swelling about the joint was very considerable; the bones were distinctly felt to grate one upon the other, shewing that the normal condition of their articulating surfaces was destroyed. Quietude, and a due application of proper local remedies, were the only chances of saving the limb. The rest was most effectually preserved by means of my joint-splint, and which allowed at the same time of as complete an application of remedies as could be desired. In this case the apparatus was kept applied for nearly five months, which perseverance was followed by the gratifying result of a fairly useful arm.

CASE III.

A young man, of twenty-four years of age, whilst walking, slipped and fell, striking his elbow violently against the curb stone. When I first saw him, about two hours after the accident, the limb around the elbow-joint was enormously swollen and bruised, so much so as to preclude the possibility of ascertaining whether there was fracture or not of either of the bones. I immediately fixed upon the arm my joint-splint, applied cold lotions, and on the following morning, about thirty hours from the time of the accident, the swelling had much subsided, and I detected a crepitus, proving that the olecranon was fractured. I put the arm in that position best adapted for such an accident, and then replaced the splint at the required angle. The lotions, &c., were continued, and every thing went on most prosperously, indeed there was not one drawback; the union of the bone was perfect in about three weeks; the motions of the arm were not at all impaired. The perfect quiet, and the constant application of the necessary remedies from the first, without any pressure upon the joint itself, may in a great measure account for the rapid decrease in the swelling, for the absence of all after inflammation or inconvenience, as also, for the speedy and perfect union of the fractured bone.

CASE IV.

A little girl, aged eight years, was brought to me on account of a contraction at the bend of the elbow, following a burn. I learnt that the accident had occurred some five years previously from her wearing-apparel catching fire; that during the time the wound was healing the arm became bent; that the cicatrix had been divided twice, and that on the last occasion a

Bartholomew's Hospital, has always manufactured my splints, &c. I would advise all who employ this apparatus, to have the bows made of steel and not brass, for the latter material adds much to the weight of the splints.

portion of the hardened skin had been removed; that considerable difficulty had been after each operation experienced in keeping the arm extended, during the progress of the healing of the wound, caused by the division of the cicatrix, and that a common straight splint had been fixed upon the back of the arm, but from the pain and uneasiness consequent upon its constant pressure, it was found necessary to remove it very frequently, and at last to abandon its use altogether. I placed upon the arm my apparatus, and with a scalpel, just slightly divided the cicatrix upon the first day, placing the arm at the angle which this division allowed, without causing pain, and there fixed it by means of the joint-splint. Two days subsequently I again saw the child and effected another division of the cicatrix, about an inch from the first, again altering the angle of the arm, and at the same time that of the splint.

This operation I repeated at five different periods at about three days' interval, and at each time placed the arm and splint at the angle which I found compatible with the child's comfort; the arm had become perfectly straight in about six weeks; the splint was, however, still retained upon the limb, the straight position being occasionally changed for an angle more or less acute as the fancy took me, thus avoiding the chance of tiring my patient. During this latter period I ordered friction and fomentations, whereby I succeeded in softening very much the cicatrized skin. The arm in about three months had almost regained its natural appearance, and its usefulness is as great as that of its fellow.

CASE V.

A man, thirty-six years of age, had the misfortune to fall and fracture his patella; he did not apply for surgical aid until some hours after the occurrence of the injury, imagining that he had only bruised his knee. Finding, however, that it became much swollen and very painful, he thought it advisable to seek relief, and upon examination I readily discovered that the above-named accident had occurred. I applied my apparatus, the upper edge of the lower splint pressing against the inferior portion of the patella, and the lower edge of the upper splint against the superior portion of the fractured bone. The two portions had become widely separated in consequence of the attempts made to walk and move after the fall, but this space was day by day much decreased by the gradual movement of the wooden splints nearer to each other, and which of course at the same time approximated the fractured surfaces of the patella. Leeches, poultices and fomentations were during this period and until the limb was restored to use, frequently and satisfactorily applied; whilst the joint and fractured bone were kept perfectly at rest and all muscular action overcome by the constant application of the joint-splint.

I may mention that the limb was elevated in this case, as is usual in such accidents, at the same time that the splint was employed. These two measures combined, caused the patient no inconvenience, but on the contrary were a source of much comfort, and decidedly tended to the rapid and solid union of the fractured patella.

Case No. 1000
The patient was admitted to the hospital on the 10th of August 1885. He was a young man, aged 25 years, and had been suffering from a severe attack of rheumatism for several weeks. The pain was most severe in the joints of the hands and feet, and was accompanied by a high fever and a rapid pulse. The patient was treated with salicylic acid and quinine, and made a complete recovery in about two weeks.

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